openreach

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Suppliers' Information Note

For The Openreach Network

OPENREACH BACKHAUL EXTENSION SERVICES 10000 (BES 10000)

Service Description

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1. Introduction

This Suppliers' Information Note (SIN) describes the Openreach Backhaul Extension Services 10000 (BES10000). The SIN provides information about the service for use by Customer Premises Equipment (CPE) manufacturers and developers.

Note: Openreach has provided formal notification that BES 10000 and BES Daisy Chain 10000 will no longer be available for new supply with effect from 30 September 2016. External shifts (re-sites and re-aranges) and upgrades will also not be available from that date.

▪ Service Outline

The BES 10000 service operates at a speed of 10.3125 Gbit/s for 10GBase-LR (10 Gigabit Ethernet LAN PHY) and 9.95328 Gbit/s for both STM-64 (10 Gigabit SDH) and 10GBase-LW (10 Gigabit Ethernet WAN PHY).

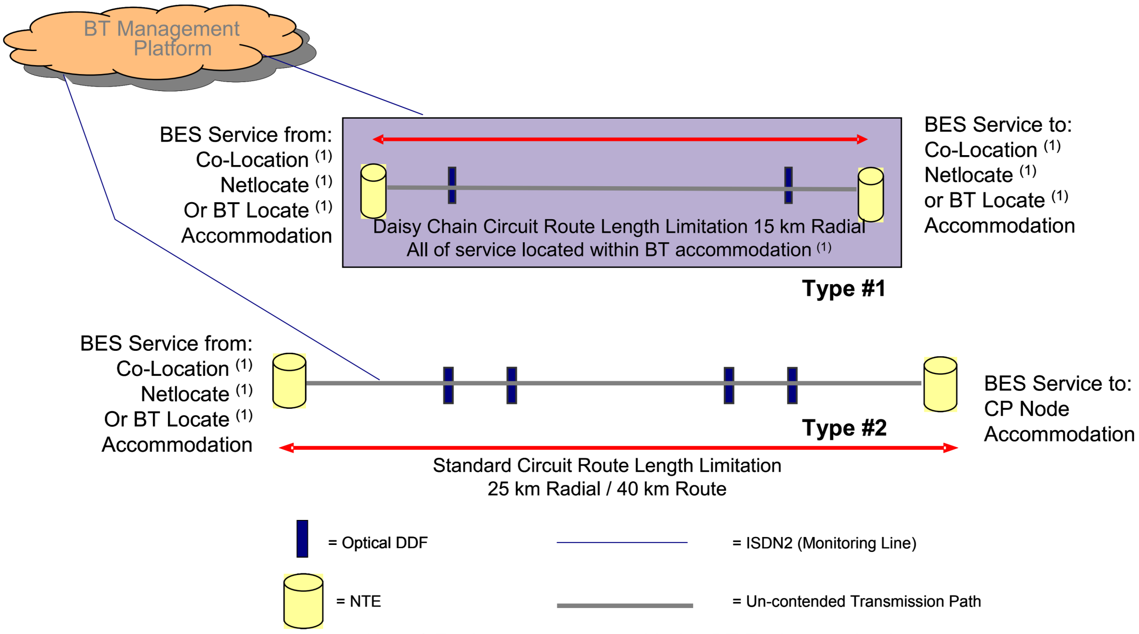
The BES 10000 service can be used as an STM-64 SDH transport service or used to interconnect Local Area Networks incorporating a 10 Gigabit Ethernet backbone.

The service is available as an unprotected BES 10000 service:

- BES 10000

  The BES 10000 service is an unprotected service. However if protection against both network fibre breaks and card failures is sought, 2 BES 10000B services may be used. The use of 2 BES 10000B circuits to provide additional resilience will result in 2 customer interfaces being presented at each site.

Figure 1. Typical BES 10000 configuration


BT Management Platform
BES Service from:
Co-Location (1)
Netlocate (1)
Or BT Locate (1)
Accommodation
Daisy Chain Circuit Route Length Limitation 15 km Radial
All of service located within BT accommodation (1)
BES Service to:
Co-Location (1)
Netlocate (1)
or BT Locate (1)
Accommodation
Type #1
BES Service from:
Co-Location (1)
Netlocate (1)
Or BT Locate (1)
Accommodation
Type #2
BES Service to:
CP Node
Accommodation
Standard Circuit Route Length Limitation
25 km Radial / 40 km Route
= Optical DDF
= ISDN2 (Monitoring Line)
= NTE
= Un-contended Transmission Path

Note 1 Equipment space provided in BT Exchanges by the Co-Locate, Netlocate and BT locate contracts must be used for PECN applications only

Technical Specification

The BES 10000 NTE supports the following types of customer interface:

1. 10.3125 Gbit/s 10 Gigabit Ethernet LAN PHY
   10GBase-LR optical presentation with IEEE 802.3 [Error! Reference source not found.] 10 Gigabit Ethernet framing.
2. 9.95328 Gbit/s 10 Gigabit Ethernet WAN PHY
   10GBase-LW optical presentation with IEEE 802.3 [Error! Reference source not found.] 10 Gigabit Ethernet framing.
3. 9.95328 Gbit/s STM-64 SDH
   S64.1 optical presentation conforming to ITU-T Recommendation G.691 [Error! Reference source not found.] and G.707 [Error! Reference source not found.]

The BES 10000 NTE does not support conversion between the three interface types listed above. The same customer interface type must be presented at each end of a BES 10000 link.

10Gig Ethernet LAN PHY and WAN PHY

10 Gigabit Ethernet conforms to the IEEE 802.3ae [Error! Reference source not found.] standard.

The interface is the Network Termination Point (NTP), i.e. the point of connection between the Openreach Network Terminating Equipment (NTE) and the CPE interface. The Customer Interface consists of a pair of SC/PC type fibre interface ports (transmit and receive). The customer provides the fibre patch connectors between the NTE and CPE; the maximum fibre length is shown in **Error! Reference source not found.**.

The 10GBase-LR and 10GBase-LW type interface is as specified in the 10 Gigabit Ethernet IEEE 802.3ae [Error! Reference source not found.] specifications. Attention is drawn to the Intellectual Property Rights (IPRs) set out in the preface of this agreed International standard. It is the responsibility of the CPE supplier to ensure that they have the necessary rights from the owner of the IPR. The IPR owner has stated that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world.

Protocol	10 Gigabit Ethernet IEEE 802.3ae [Error! Reference source not found.]
Line Rate	10.3125 Gbit/s for 10GBase-LR (LAN PHY) and 9.95328 Gbit/s for 10GBase-LW (WAN PHY)
Maximum Bit Error Rate	10^{-12}
Power Requirement	See Section 4.2
Customer Fibre Connector	SC/PC type
Customer interface Fibre *(Customer provided)*	Single-mode 1310nm, 9/125 micron
Customer interface Fibre Maximum Delivery Distance	10km from NTE's 10GBase-LW or 10GBase-LR port

Operating Temperature	5° to 40° C
Laser Safety	Class 1 under all conditions as per IEC 825-1 [Error! Reference source not found.]

Table 1. 10 Gigabit Ethernet LAN and WAN PHY NTE technical specification

▪ Network Fibre Break

In the event that there is a network fibre break, the customer interface will shut down if it is operating with customer equipment using a 10GBase-LR interface. This will be seen on customer equipment as a LOS (Loss of Signal) condition.

Customer equipment using a 10GBase-LW interface will see MS-AIS generated at each end of a BES10000 link in the event of a network fibre break, in accordance with IEEE 802.3ae [Error! Reference source not found.]. The fault propagation behaviour of the NTE customer port operating in 10GBase-LW mode may be changed from generation of MS-AIS to generation of LOS (Loss of Signal) by special request.

▪ Frame Size

The minimum and maximum Ethernet frame size supported by the BES 10000 service is determined by the customer's equipment not the BES 10000 NTEs. The BES 10000 service can support any frame size supported by the customer's equipment.

○ STM-64 10 Gigabit SDH

The STM-64 interface conforms to ITU-T Recommendation G.707 [Error! Reference source not found.] and G.691 [Error! Reference source not found.].

The interface is the Network Termination Point (NTP), i.e. the point of connection between the Openreach Network Terminating Equipment (NTE) and the CPE interface. The Customer Interface consists of a pair of SC/PC type fibre interface ports (transmit and receive). The customer provides the fibre patch connectors between the NTE and CPE; the maximum fibre length is shown in **Error! Reference source not found.**.

The STM-64 S64.1 interface is as specified in ITU-T G.691 [Error! Reference source not found.] recommendations. Attention is drawn to the Intellectual Property Rights (IPRs) set out in the preface of this agreed International standard. It is the responsibility of the CPE supplier to ensure that they have the necessary rights from the owner of the IPR. The IPR owner has stated that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world.

Protocol	G.707 STM-64 according to ITU-T G.707
Line Rate	9.95328 Gbit/s
Maximum Bit Error Rate	10^{-12}
Power Requirement	See Section 4.2
Customer Fibre Connector	SC/PC type
Customer interface Fibre *(Customer provided)*	Single-mode 1310nm, 9/125 micron

Customer interface Fibre Maximum Delivery Distance	10km from NTE's customer port.
Operating Temperature	5° to 40° C
Laser Safety	Class 1 under all conditions as per IEC 825-1 [Error! Reference source not found.]

Table 2. STM-64 customer interface NTE technical specification

Network Fibre Break

Customer equipment using an STM-64 interface will see MS-AIS generated at each end of a BES10000 link in the event of a network fibre break, in accordance with ITU-T G.707 [Error! Reference source not found.].

The fault propagation behaviour of the NTE customer port operating in STM-64 mode may be changed from generation of MS-AIS to generation of LOS (Loss of Signal) by special request. The generation of the LOS condition is achieved by shutting down the customer port on the BES 10000 NTE.

Transparency

The BES 10000 service is a physical layer transport with a high level of transparency. Where compatibility issues are encountered that result in the B1 byte being incorrectly reported, a completely transparent option can be enabled on the interface. The only requirement of the interface operating in transparent mode is that the customer signal operates at 9.95328 Gbit/s.

This mode of operation will not generate MS-AIS in the event of a network fibre break (but instead shutdown the customer port). In either transparent or standard mode, the customer signal is transported transparently by the BES 10000 NTE.

Physical Arrangements

Physical Location of Connectors

The User–Network Interface (UNI) is located at the connector on the Openreach Network Terminating Equipment (NTE) with a connector on the Customer side as described in the relevant part of Section 3 of this document.

NTE Power Supply Requirements

General

By placing a order with Openreach the customer has accepted the conditions placed by Openreach. In relation to powering of equipment, the customer must comply with the requirements of BS7671 and the details giving within the 'DC Power Planning and Installation Guide for WES-BES Products' document.

The Openreach NTE is locally powered and offers AC or DC power options. The CP will be required to provide either a local 50Hz AC supply in the form of two standard 13 Amp power socket(s); or dual -50V DC power distributions and Earth connections, with all wiring colour schemes conforming to BS7671 (IEEE Wiring Regulations). It will be the customers' responsibility to ensure that the power supply is fused and safe for Openreach to use. These should be in close proximity to the NTE installation location.

Installation and Testing

In addition to the NTE and Chassis powering requirements below, a spare 50Hz AC mains supply 13A socket should also be provided in close proximity to the NTEs, to power Openreach test equipment during both initial commissioning and subsequent maintenance support activities.

- AC Power connection

AC power connection between Openreach equipment and the power socket will be made using a standard IEC320 C13-14 power lead fitted with a standard 13A plug. The NTE itself has dual power supply units and requires two AC mains supply sockets.

- ***For most installations:***

  This will require two mains connection for each NTE provided, and the consumption of the Openreach NTE and power unit chassis in this unmanaged service arrangement will be no more than 150 Watts per NTE.

- DC Power Connection

The DC In-Line (Molex) connector is specified as the standard method of connecting DC power by Openreach, and represents the "Demarcation Point" between Openreach and the customer. At their site, the customer is required to provide suitable power and earth connection to, and be responsible for the supply, wiring and labelling to the demarcation point. Openreach will not supply or install the DC distribution system as part of the standard Ethernet installation.

- ***Customer provided wiring up to the Openreach specified In-Line connector.***

  Wiring, MCB isolation or fuse (i.e. C Type MCB or Cartage Fuse), must be provided by the customer, up to and including the DC in-line connector, as per BT's requirements stated within the 'DC Power Planning and Installation Guide for WES-BES Products' document with respect to:

  (i) Correctly rated MCB/Fuse,

  (ii) Correct labelling of wiring and MCB/fuse positions compliant with BS 7671,

  (iii) Correct size of cable for required voltage drop at required maximum current,

  (iv) Separately fused isolatable A & B power supplies, as detailed in the 'DC Power Planning and Installation Guide for WES-BES Products' document.

  The in-line connector has a maximum current handling capability of 6A, and is not to be used for equipment requiring greater than a 6A supply (such as the Nortel OPTera 5200 equipment, which require 20A feeds).

- Additional Details

For further details on the provision of DC Power, see the 'DC Power Planning and Installation Guide for WES-BES Products' available on the Openreach Ethernet website.

If there is a conflict between DC power information contained in the 'DC Power Planning and Installation Guide for WES-BES Products' and the SIN document, the order of precedence shall be as follows:

(a) DC Power Planning and Installation Guide for WES-BES Products
(b) SIN

▪ Service Availability and Tariffs

For further information on service availability and tariffs please contact your Openreach Customer Business Manager, or see
http://www.openreach.co.uk/orpg/products/bes.do

▪ References

[1]	IEEE 802.3, Standards for Local Area Networks: CSMA/CD Access Method
[2]	IEC 825-1, International Electrotechnical Commission (IEC) Standard – Safety of Laser products Part 1
[3]	BTNR 2511 - Interface of telecomms equipment with a nominal 48v negative dc power supply
[4]	IEEE 802.3ae, IEEE standards for 10 Gigabit Ethernet in the LAN/WAN, 2002
[5]	ITU-T Recommendation G.691 Optical interfaces for single channel STM-64, STM-256 and other SDH systems with optical interfaces
[6]	ITU-T Recommendation G.707 Network node interface for the synchronous digital hierarchy (SDH)

For further information or copies of referenced sources, please see document sources at
https://www.openreach.co.uk/orpg/home/helpandsupport/sins/sins.do

▪ Abbreviations

BES	Backhaul Extension Services
BT	British Telecommunications plc
CPE	Customers' Premises Equipment
CSMA	Carrier Sense Multiple Access
IEC	International Electrotechnical Commission
IEEE	Institute of Electronic and Electrical Engineers [USA]
IPR	Intellectual Property Right
LAN	Local Area Network
LOS	Loss of Signal
MCB	Mini Circuit Breaker
MS-AIS	Multiplex Section – Alarm Indication Signal
NTE	Network Termination Equipment

NTP	Network Terminating Point
SC/PC	Subscription Channel / Physical Contact
PHY	Physical Layer Device
SDH	Synchronous Digital Hierarchy
STM	Synchronous Transport /Transfer Mode
SIN	Suppliers' Information Note [BT]
UNI	User-to-Network Interface
WAN	Wide Area Network

▪ History

Issue	Date	Revision changes
1.0	29 Sep 2006	First issue.
1.1	30 Oct 2007	Service description amended in accordance with updated DC power guidance
1.2	June 2010	Changes made to clarify use of term BES Updates made to sections 3.2.3 "AC Power Connection" and 3.2.4 "DC Power Connection"
1.3	February 2015	Change SINet site references from http://www.sinet.bt.com to http://www.btplc.com/sinet/
1.4	June 2016	Addition of notice to advise that BES 10000 and BES 10000 Daisy Chain will no longer be available for new supply with effect from 30 September 2016
1.5	August 2020	Changes to branding, from BT to Openreach including changes to reflect new Openreach SIN site and Openreach SIN email address
1.5	July 2021	Annual Review – no changes required – issue remains unchanged.
1.5	July 2022	Annual Review – no changes required – issue remains unchanged.
1.5	July 2023	Annual Review – no changes required – issue remains unchanged.
1.5	August 2024	Annual Review – no changes required – issue remains unchanged.

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